applying oxygen upstream of said second emission control device to oxidize hydrocarbons stored in said second emission control device and hydrocarbons from said combusted rich air-fuel mixture.

12. (New) The method of claim 11, further comprising the step:

indicating when said second emission control device needs to be purged of hydrocarbons.

13. (New) The method of claim 12, wherein said step of indicating when said second emission control device needs to be purged of hydrocarbons includes the steps:

measuring a temperature of exhaust gases entering said second emission control device; and

determining when said second emission control device needs to be purged of hydrocarbons when said temperature is greater than a threshold temperature.

REMARKS

Applicant thanks the Examiner for his careful consideration of the subject application. Claims 1-10 were previously pending in the present application. The Examiner rejected claims 1 and 8 under 35 U.S.C. 102(b) in light of U.S. Patent No. 5,887,422 to Abe et al. Further, the Examiner rejected claims 2-7 and 9-10 under 35 U.S.C. 103 in light of Abe as modified by U.S. Patent No. 5,916,129 to Modica et al. In response to the Examiner's rejection, Applicant has (i) deleted claims 1-4, (ii) combined the elements of claim 8 with claim 9, and (iii) added new claims 11-13. As a result, Applicant submits that the Examiner's rejections under 35 U.S.C. 102 have

been avoided. Further, Applicant respectfully traverses the Examiner's rejections under 35 U.S.C. 103 and requests further consideration of the application in light of the following comments.

Currently-pending independent claim 5 is directed to a method for controlling an air/fuel ratio in an internal combustion engine, comprising the steps:

> - purging hydrocarbons from an emission control device; and
>
> - adjusting the air/fuel ratio in the engine *rich* of stoichiometry while purging the hydrocarbons.

In other words, the engine air/fuel ratio is caused to be *rich* of stoichiometry when the hydrocarbon trap is purged. The Examiner concedes that Abe, the primary cited reference, does not disclose this step. *See,* Examiner's Office Action, p.3, lines 11-12. However, the Examiner asserts that this step is disclosed in Modica, and that it would have been obvious to one skilled in the art to modify Abe in light of Modica. Applicant respectfully disagrees.

First, Applicant submits that the Examiner has not identified a proper motivation to combine the teachings of Abe and Modica. Abe is directed to an exhaust gas purification system that includes a hydrocarbon adsorbent and a downstream catalyst capable of catalyzing hydrocarbons. Abe discloses "adding an oxidizing gas to the exhaust gas or regulating amounts of combustion air and fuel" when hydrocarbons are desorbed from the adsorbent in order to catalyze the desorbed hydrocarbons. *See,* Abe, lines 3:38-50. Abe specifically states that "[w]hen the HC and the like are desorbed, it is **indispensable** that an oxidizing gas is added or an exhaust gas composition containing excessive oxygen is provided by adjusting amounts of combustion air and fuel." *See,* Abe, lines 6:58-64 (emphasis added). As is well-known in the art, a *lean* engine air/fuel mixture produces excess oxygen in the

exhaust gas. Thus, Abe teaches that it is indispensable that a "lean air/fuel mixture" be combusted when hydrocarbons are desorbed from an adsorbent to prevent an excessive amount of hydrocarbons from entering a downstream catalytic converter and ultimately being expelled from the vehicle exhaust system. Therefore, Abe clearly teaches away from using a "rich air/fuel mixture" when purging a hydrocarbon trap, as recited in claim 5.

Modica is directed to an emission control system that includes a system catalyst, a sulfer oxide adsorbent, and a heat exchanger. *See,* Modica, lines 3:58-63. The sulfer oxide adsorbent is used to prevent sulfer in the system from degrading the efficiency of the system catalyst. Applicant, however, has been unable to find any suggestion by Modica of adjusting the engine air/fuel ratio rich of stoichiometry *when hydrocarbons are being purged from an emission control device.* To the contrary, Modica only teaches operating the engine with a rich air/fuel mixture to reduce *NOx* in a catalyst. *See,* Modica, lines 15:21-32. Thus, because the primary reference (Abe) teaches away from the proposed combination, and the secondary reference (Modica) simply does not recognize that a rich air/fuel ratio can be combusted during hydrocarbon purging, Applicant respectfully submits that there is no proper motivation to combine the teachings of Abe and Modica.

Second, even if Abe and Modica are combined, the combination does not disclose all of the limitations of claim 5. Conceding that Abe fails to disclose the step of adjusting the engine air/fuel ratio rich of stoichiometry while purging hydrocarbons from an emission control device, the Examiner indicates that "Modica teaches that it is conventional in the art to utilize the adjusting step which biases said engine air-fuel ratio rich." *See,* Examiner's Office Action, p.3, lines 12-13. However, as discussed above, Modica clearly does *not* teach that it is known to adjust the engine air/fuel ratio

rich *when hydrocarbons are being purged from an emission control device,* as recited in claim 5. In contrast, Modica only shows using a rich air/fuel ratio to reduce NOx in a catalyst. Because the combination of Abe and Modica does not disclose all of the limitations of claim 5, Applicant submits that independent claim 5, and dependent claims 6-7 are allowable over the cited references.

Similarly, claims 9-10 all recite that the engine air/fuel ratio be biased rich of stoichiometry when hydrocarbons are purged from an emission control device. Thus, for the same reasons set forth above, Applicant submits that claims 9-10 are also allowable over the cited references.

Finally, all of the newly-added claims 11-13 are directed to a method for controlling an engine, having the steps:

> - combusting an air-fuel mixture rich of stoichiometry in an engine cylinder to reduce NOx stored in said first emission control device; and
>
> - applying oxygen upstream of said second emission control device to oxidize hydrocarbons stored in said second emission control device *and hydrocarbons from said combusted rich air-fuel mixture.*

Claims 11-13 all require applying oxygen to the exhaust stream to oxidize hydrocarbons stored in the second emission control device *and* hydrocarbons from combusted rich air-fuel mixture. In other words, claims 11-13 recite combusting a rich air/fuel ratio *while* hydrocarbons are being released from an emission control device. As described above, neither of the cited references teaches this arrangement. Because the combination of Abe and Modica does not disclose all the limitations of claim 11, Applicant submits that claim 11 and dependent claims 12, 13 are allowable over the cited references.

CONCLUSION

Therefore, Applicant submits that all pending claims are distinguished over the cited prior art and are in condition for allowance. If the Examiner has any questions or issues relating to Applicant's response, he is encouraged to telephone the undersigned representative.

It is believed that any additional fees due with respect to this paper have already been identified in any transmittal accompanying this paper. However, if any additional fees are required in connection with the filing of this paper that are not identified in any accompanying transmittal, permission is given to charge account number 06-1510 in the name of Ford Global Technologies, Inc.

Respectfully submitted,

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MARKED UP VERSION OF ALL AMENDED CLAIMS

5. (First Amended) A method of controlling an air/fuel ratio in an internal combustion engine, comprising the steps:

purging ~~a hydrocarbon trap for a period of time~~ hydrocarbons from an emission control device; and

adjusting the air/fuel ratio in the engine ~~more~~ rich of stoichiometry while purging the hydrocarbons~~during said period of time~~.

9. (First Amended) ~~The system of claim 8, wherein said controller causes said air/fuel ratio in the engine to be adjusted rich.~~ A system for controlling an air/fuel ratio in an internal combustion engine, comprising:

a hydrocarbon trap positioned in an exhaust path downstream of the engine;

an air supply device capable of selectively providing a supply of air to said exhaust path upstream of said hydrocarbon trap; and

a controller for biasing the air/fuel ratio in the engine rich of stoichiometry during a time period when said air pump is providing air to said exhaust path.